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(54) Title: **ARTIFICIAL TISSUE SYSTEMS AND USES THEREOF**

(57) **Abstract:** An implant system and a method for controlling the natural and artificial microenvironments surrounding an implanted device using an artificial tissue system (ATS) and includes methods of diagnostic and testing related thereto. The ATS, among other things, induce better integration, function, and extended lifespan of the devices at the site of implantation. The ATS includes cells, such as naturally occurring, engineered, and/or artificial cells; matrices such as natural, engineered, artificial and/or hybrid matrices; tissue response modifiers (TRM); and/or cell response modifiers (CRM). The specific composition of the ATS is based on the nature of the tissue in which ATS-device combination is implanted and the nature of the implant device, as well as the required function and lifespan of the implanted device. Additionally, the ATS, as well as ATSdevice combinations can be utilized *in vitro* to aid in the design of improved ATS, devices and ATS-device combinations for *in vivo* uses.

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